In a previous advanced homework you encountered the region bounded by \( y = k \), \( y = 2 - 2x^2 \), and the \( y \)-axis, where \( k \) is a positive constant smaller than 1.

In this problem, assume the shape is a metal plate with variable density \( \rho = 4 - x \).

Set up an integral for the mass of the plate.

\[
A = \int_{a}^{b} \rho \, dx
\]

where the bounds of integration are

\[ a = \]  
\[ b = \]

Do not evaluate your integral.
In a previous advanced homework you encountered the region bounded by $y = k$, $y = 2 - 2x^2$, and the $y$-axis, where $k$ is a positive constant smaller than 1.

In this problem, assume the shape is a metal plate with variable density $\rho = y$.

Set up an integral for the mass of the plate:

$$ A = \int_a^b \quad \text{where the bounds of integration are}$$

$\begin{align*}
a &= \\
b &= \\
\end{align*}$

Do not evaluate your integral.
Consider the region that lies in the first quadrant bounded above by $y = 4 - x^2$ and bounded below by the $x$-axis as shown.

In this problem, assume the shape is a metal plate with variable density

$$p = \sqrt{4 - y}$$

Find the line $y = b$ such that the mass above the line is equal to the mass below the line. Give an exact answer.

$$b =$$